



Practice Aptitude Assessment
For
Engineering Industry
(Apprentice Engineer)



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Group Training Australia (SA) Inc.
December 2005

Acknowledgements

This practice aptitude assessment would not have been possible without the support of the State Government, Group Training Australia (SA) Inc and the support and expertise of the many people listed below. I would especially like to thank Jerry Nowak for the tireless amount of work and effort he has put into the maths component of this project. I over-estimated the size of the task, however Jerry was so keen to see the project through he put in countless hours over and above what he was required to give, his supreme dedication and his great passion enabled me to produce a much needed resource for students contemplating a career in the trades.

I am sure that over the years many thousands of students will benefit from Jerry's dedication to the project.

Another special mention must go to Jane Harvey. Jane was the person who initially panted the seed in respect of developing an aid to assist students prepare themselves for interviews and assessments for the trade areas. Jane has been there during the planning and programming stages, to assisting with the coordination of the many other people who have assisted in some form in the development of this resource, to grouping the maths examples under appropriate headings and preparing the answers. Jane has fought with me every inch of the way, through thick and thin at times, to produce a quality product which we hope will fill a vast void that has been identified in this sector of the VET/Career education pathway of students.

Department of Education and Children's Services
Premier's Industry Awards for Teachers of Science and Mathematics

Department of Further Education Employment Science and Technology

Jerry Nowak	Underdale High School
Jane Harvey	Western Futures – Futures Connect
Bernie Fitzsimons	Catholic Education South Australia
Bob Oglanby	Port Adelaide Training and Development Centre (PATDC)
Christine Johns	Association of Independent Schools of South Australia
Dave Butcher	Engineering Employers Association Group Training Scheme
Frank Spiel	Underdale High School
Hayley Hobson	Group Training Australia (SA) Inc.
Helen Lambert	Association of Independent Schools of South Australia
Janice Paget	Maxima Group Training
Kristian O'Leary	Pathways North East
Michael Boyce	PEER Training
Michael Wakefield	Traineeship and Apprenticeship Placement Services
Peter Both	Office of Learning Improvement & Support Services – Futures Connect
Peter Sach	Hamilton Secondary Collage
Rebecca Avery	AFL SportsReady
Rob Drysdale	Engineering Employers Association Group Training Scheme
Robert Keage	Pathways North East
Sue Gillespie	Statewide Group Training

Guidance

This assessment has been developed with the assistance of Industry and Registered Training Organisations, based on the needs and requirements of the Industry sector.

Please note that rates quoted in this assessment for various items, including pay rates, are not meant to reflect today's values, but are used purely for mathematical purposes.

This assessment is intended to prepare people who may be required to sit an aptitude test as part of an interview and assessment process for a job vacancy, such as an apprenticeship.

The assessment can be used by a number of different organisations or people such as Group Training Organisations, Career Education Teachers, Mathematics Teachers within schools or New Apprenticeship Centres.

The assessment can be:

- provided to individual people to enable them to practice and hone their skills before sitting an actual aptitude test.

- used by Career Education Teachers for individuals or in a class setting to provide general guidance to students on what they may expect during the interview process if they intend commencing a career as an apprentice.

- used by Mathematics Teachers as a guide to Industry mathematics requirements at the entry point of a particular apprenticeship career path.

This practice aptitude assessment has two components; Mathematics and Literacy. You may find that this assessment differs from similar tests administered by Industry as their tests may have other elements included, that this one does not, such as:

- Mechanical Reasoning;
- Engineering Knowledge and reasoning;
- General Knowledge

The mathematics questions contained within this document are equivalent to Applied Mathematics at the Year 10 level in South Australia.

The assessment should be able to be completed in approximately 1 hour 30 minutes. Calculators may be used to complete this practice assessment.



ENGLISH

Spelling

1. Put the following words or group of words into alphabetical order: _____
- | | | |
|----------------------------|-------------------------------|-------|
| Toolmaker | Computer numerical controlled | _____ |
| Engineering | Computer aided design | _____ |
| Computer aided manufacture | Welders | _____ |
| Boilermaker | Engineering patternmakers | _____ |
| Weighing | Design moulds | _____ |
2. The following text has 10 spelling errors in it. Correct those errors and list them in the order you find them. _____
- Toolmackers make precision equipment and tools used to manufacture mechinary. They use precision measuring equipment and may use CNC machines and computer ayded manufacturing (CAM) systems to acheive very precise finishes and sises. Any company manufacturing presed metal or plastic items requires the service of a toolmacker. _____
3. The following text has 12 spelling errors in it. Correct those errors and list them in the order you find them. _____
- Computer Aideded Design (CAD) sistems are used by Mechanical Draftters to simulate the preformance of a product. They can test whether a brige will carry predicted lodes safely, or even whether tomatoe sauce will pore correctly from a newlee designed container. _____

Comprehension

This is a test of how well you understand what you read. You should read the following passage and answer the questions that follow.

Motoring History

"Even in recent times I've been called a conman and worse!" protests Ralph Sarich in a new biography of the most controversial man on the Australian motoring scene.

"Who have I conned? BHP, Ford and the banks who have invested in us? If so, how do they continue to do business with us?"

The fight for credibility is only part of the story told in *Sarich the Man and His Machines* by Pedr Davis. There is

also the extraordinary financial history of the Orbital Engine Co, two decades of engine development, the remarkable early life of the inventor and plans for the future.

Two years ago, Modern MOTOR commissioned Pedr Davis, an experienced auto engineer, to visit Sarich and evaluate the Orbital Combustion Process engine. Not surprisingly, he pursued the theme until he had enough material for his book. The new book reveals a wealth of information on the enigmatic West Australian.

It all seems to be there- the hope and hype generated by the rotary- type "Orbital engine" Sarich developed during the 1970s, the battles between Sarich and race engine guru Phil Irving and the emergence of the new and different OCP two cycle engine early in the 1980s.

The most interesting part to these eyes is the full technical appendix describing the original Orbital engine and the later OCP engine in great depth.

Sarich always seems a contradiction - on the one hand a vast amasser of funds and a man who seems to have no hesitation delivering deadlines and ultimatums to Prime Ministers and corporate presidents.

On the other hand, he is donator of millions to medical foundations and a man who once could have walked away from his engine company with nearly half a billion dollars but steadfastly refused to sell a single share or cut back his 70 - 100 hour working week. This book only heightens the contradiction of Sarich - engine man, property developer, karate exponent and inventor of things as varied as an automatic garden sprinkler and self tipping trailer.

4. Who is the author of the book title, *Sarich - the Man and his Engines*?

- a) Modern Motor
- b) Phil Irving
- c) Pedr Davis
- d) Ralph Sarich

5. The "Orbital engine" was developed in:

- a) 1982
- b) 1970s
- c) 1980s
- d) 1975

6. Sarich was

- a) An engine man
- b) Karate exponent
- c) Inventor
- d) All of the above

MATHEMATICS

Numbers (Conversions, Estimation, Time)

1. Convert the following:

- (a) \$2.41 to cents
- (b) 182 days to weeks
- (c) 3 hours and 12 seconds to seconds
- (d) 8 kilometres to metres
- (e) 3.5 kilograms to grams

2. Arrange in ascending order (from smallest to largest):

4	-2	$\frac{1}{2}$	3.7	0	-8
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3. How many hours and minutes from 7:45 am to 3:15 pm?

4. Select the best estimate for the following:

(a) 4249×71

280000	150000	28000
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(b) $80000 \div 38$

200	2000	20000	4000
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5. Round

- (a) 35.6754 to two decimal places
- (b) 425.8 to the nearest tens

Fractions

6. Add the following:

- (a) $\frac{1}{4} + \frac{1}{2}$
- (b) $\frac{2}{9} + \frac{5}{6}$

7. Evaluate the following:

- (a) $\frac{5}{6} - \frac{1}{4}$
- (b) $2\frac{1}{14} - \frac{4}{7}$

8. Express as a fraction in lowest terms:

- (a) 0.75
- (b) 2.6
- (c) 30%

Decimals

9. Find the decimal number halfway between:

- (a) 0.6 and 0.8
- (b) 2.8 and 2.9

10. Select the correct answer to $18.642 \div 0.02$:

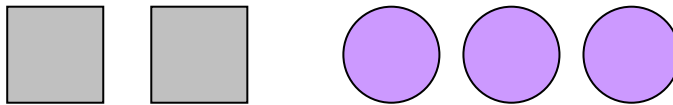
- A: 9.321
- B: 93.21
- C: 9321
- D: 932.1

Percentages

11. Michael earns \$500 a week. He gets a pay rise of 5%. What is his new wage? _____
12. What percentage is 30 out of 50? _____
13. In an order of 2000 hexagonal nuts, 40 were defective. What percentage were:
(a) defective _____
(b) good _____
14. The price of a micrometer is normally \$84. During a sale, there was a 25% reduction. Calculate the sale price? _____

Ratio

15. What is the ratio of the number of circles to squares? _____



16. A cutting wheel cuts through 0.5cm of steel in 1 minute. How long will it take to make a cut 3.5cm deep? _____
17. An air conditioning unit circulates 320 cubic metres of air per minute. How many cubic metres of air is circulated in a hour? _____
18. Two gears have 12 and 15 teeth respectively. What is the ratio of the number of teeth on the first gear to the number of teeth on the second gear in lowest terms? _____

Algebra

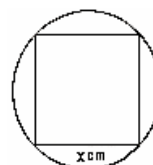
19. The formula for the area of a triangle is $A = \frac{1}{2}BH$. Make B the subject of the formula. _____
20. The length of a metal rod is $48.6\text{mm} \pm 0.03\text{mm}$. What is the length of the smallest rod that will be accepted? _____

Area

21. The area of a tin plate is 15 cm^2 . Its width is 3 cm. Find the length of the plate? _____

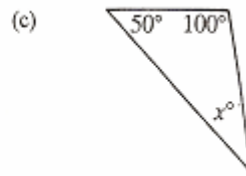
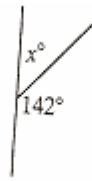
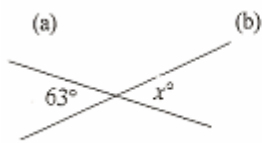


22. A piece of wire is 24 cm long and is bent in the shape of a rectangle so that the length is twice its width. Find the area of the rectangle? _____
23. A square is inscribed in a circle of radius 5 cm. Calculate:
(a) the area of the circle (Correct to two decimal places) _____
(b) the diameter of the circle (Correct to two decimal places) _____
(c) the value of x _____
(d) the area of the square. _____

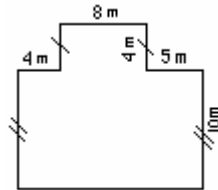


24. The diameter of the circle is 4 cm. Work out the area of the inscribed square?

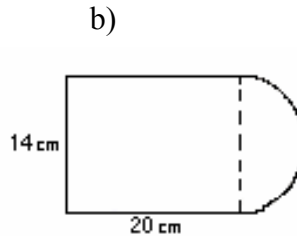
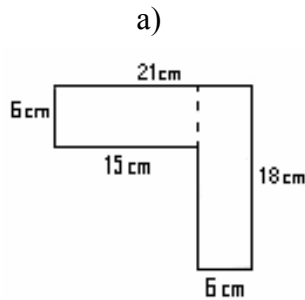
25. Find the value of x :



26. From the sheet metal shown, calculate the unmarked lengths?



27. Calculate the area of the shapes shown? For b) use $\pi = \frac{22}{7}$



Problem Solving

28. Two numbers add up to 40. Find the other number if one is 15?

29. Peter the engineer is paid \$16.00 per hour plus time and a half for any hours over 35 hours. If he worked 42 hours, what was his pay for:

- (a) the first 35 hours work
- (b) the overtime work only
- (c) total pay?

30. An engineer cut two pieces of metal rod each $10\frac{1}{2}$ cm long from a rod 50 cm long. How much of the original rod was left?

31. The weight of three bolts are 52g, 49g, and 61g. What is the average weight of the bolts?

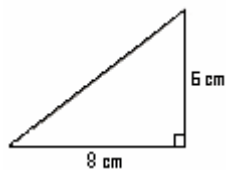
32. A 4 metre length of steel is cut into 5 sections. How long is each piece (ignoring the saw cuts)?

33. A steel ingot weighs 230 grams. How much would 6 ingots of steel weigh?

34. A truck delivers 5 loads of steel rods. If each truck load weighs 3000kg, what was the total weight of rods delivered?

35. A machinist drills a hole 65 mm into a block of steel 10 cm thick. How much further is left to drill?

36. A hacksaw blade has 4 cutting teeth every centimetre. If the blade is 30 cm long, how many teeth are there? _____
37. John had three quotes for a small engineering job, \$124, \$137 and \$114. What is the average price for the quotes? _____
38. The following lengths were cut from a piece of angle iron: 8 cm, 27cm, 41cm, 37cm, and 16 cm. What was the total length cut? (ignore the saw cuts) _____
39. A welder requires 8 welding rods to weld a bracket into place. How many welding rods are required to weld 12 brackets? _____
40. It takes 7 minutes to grind a shaft. How many shafts can be ground in 1 hour and 3 minutes? _____
41. The mass of 30 identical machine screws is 180 grams. What is the mass of 1 screw? _____
42. Nine similar pieces of sheet metal have a total thickness of 0.27 cm. What is the:
- (a) thickness of 1 piece _____
- (b) thickness of 4 pieces? _____
43. An assembly worker takes 30 seconds to build a component. How many components can be assembled in 1 hour? _____
44. A grinding wheel speed is 800 revolutions a minute. In half an hour, how many times has the wheel rotated? _____
45. The electric motor on a cement mixer rotates the drum once every 6 seconds. How many revolutions will the drum make in 12 minutes? _____
46. If one litre of paint covers 12 square metres, how many litres of paint is needed to paint a lounge room which has an area of 36 square metres? _____
47. Find the hypotenuse of a right-angled triangle with sides 6 cm and 8 cm? _____



ANSWERS

ENGLISH

1. Boilermaker, Computer aided design, Computer aided manufacture, Computer numerical controlled, Design moulds, Engineering, Engineering patternmakers, Toolmaker, Weighing, Welders
2. Toolmakers, equipment, machinery, aided, achieve, sizes, manufacturing, pressed, requires, toolmaker
3. Aided, systems, Mechanical, Drafters, performance, whether, bridge, loads, whether, tomato, pour, newly
4. c) 5. b) 6. d)

MATHEMATICS

1. a) 241 cents, b) 26 weeks, c) 10,812 seconds, d) 8,000m, e) 3,500g
2. -8, -2, 0, $\frac{1}{2}$, 3·7, 4
3. 7 hours & 30 minutes
4. a) 280000, b) 2000
5. a) 35·68, b) 430
6. a) $\frac{3}{4}$, b) $1\frac{1}{18}$
7. a) $\frac{7}{12}$, b) $1\frac{1}{2}$
8. a) $\frac{3}{4}$, b) $2\frac{3}{5}$, c) $\frac{3}{10}$
9. a) 0·7, b) 2·85
10. D
11. \$525
12. 60%
13. a) 2%, b) 98%
14. \$63
15. 3:2
16. 7 minutes
17. 19,200m³
18. 4:5
19. $B = \frac{2A}{H}$
20. 48·57cm
21. 5cm
22. 32cm²
23. a) 78·5cm², b) 10cm, c) $\sqrt{50}\text{cm} = 7.07$, d) 50cm²
24. 8cm²
25. a) 63°, b) 38°, c) 30°
26. 10m, 17m
27. a) 198cm², b) 357cm²
28. 25
29. a) \$560, b) \$168, c) \$728
30. 29cm
31. 54g
32. 0·8m
33. 1380g or 1·38kg
34. 15,000kg
35. 935mm
36. 120 teeth
37. \$125
38. 129cm
39. 96 welding rods
40. 9 shafts
41. 6g
42. a) 0·03cm, b) 0·12cm
43. 120 components
44. 24,000 revolutions
45. 120 revolutions
46. 3 litres
47. 10cm